

THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALLS

UNIVERSITY OF LONDON

291 0109 ZB

BSc/Diploma Examination
for External Students

**COMPUTING AND INFORMATION SYSTEMS AND
CREATIVE COMPUTING**

Introduction to Java and Object-Oriented Programming

Dateline: Friday 22 May 2009 : 10.00 – 1.00 pm

Duration: 3 hours

There are **FOUR** questions in this paper. Full marks will be awarded for complete answers to **FOUR** questions. Each question carries 25 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.

There are 100 marks available on this paper.

No calculators may be used.

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QUESTION 1

(a) For each of the following loops, say how many asterisks are printed:

- (i) `for(int i=0;i<6;i=i+1) System.out.println("*");`
- (ii) `int i=1; while (i<4){System.out.println("*");i++;}`
- (iii) `for(int i=-1;i<4;i=i+1) System.out.println("*");`
- (iv) `for(int i=0;i<4;i=i+2) System.out.println("*");`
- (v) `int i=0; while (i<4000){System.out.println("*");i=i+2;}`
- (vi) `for(int i=0;i>=-1;i=i+1) System.out.println("*");`
- (vii) `for(int i=5;i>=7;i=i+1) System.out.println("*");`
- (viii) `int i=0; while (i>1000){System.out.println("*");i=i+2;}`
- (ix) `int i=4; while (i>=2){System.out.println("*");i=i+1;}`

[9 Marks]

- (b) (i) If we do a linear search of 128 items, and it takes 1 millisecond for each comparison, on average how long will it take us to find the item we are searching for? (Assume the item we are searching for does occur somewhere.)
- (ii) If we do a binary search of 128 items, and it takes 1 millisecond for each comparison, on average how long will it take us to find the item we are searching for? (Assume the item we are searching for does occur somewhere.)
- (iii) Explain the purpose of this code fragment:

```
{int t=a[x];a[x]=a[y];a[y]=temp;}
```

- (iv) What is the purpose of the following method:

```
public static boolean l(int [ ] a, int size, int thing)
{
    int i;
    for (i=0;i<size&& a[i]!=thing;i++);
    return (a[i-1]==thing);
}
```

(question continues on next page)

[8 Marks]

- (c) (i) What is the main difference between a Vector and an array?
- (ii) Write a method which returns the shortest String in a Vector of Strings. (if more than one of the same length it returns the first).

[8 Marks]

QUESTION 2

- (a) (i) What is the output of the following Java program?

```
class Bool2
{
    public static void main(String[] args)
    {
        if (true) System.out.print("hello");
        else      System.out.print("goodbye");
    }
}
```

- (ii) What is the output of the following Java program?

```
class Bool3
{
    public static void main(String[] args)
    {
        if (false) System.out.print("hello");
        else       System.out.print("goodbye");
    }
}
```

- (iii) What is the output of the following Java program?

```
class Bool5
{
    public static void main(String[] args)
    {
        System.out.println(!!(true));
    }
}
```

[9 Marks]

(question continues on next page)

(b) (i) What does the following program do?

```
import java.io.*;
public class cat
{
    public static void main(String[] args) throws Exception
    {
        FileReader inone =new FileReader(args[0]);
        int t=inone.read();
        while (t!=-1)
        {
            System.out.print((char)t);
            t=inone.read();
        }
    }
}
```

(ii) What does the following program do?

```
import java.io.*;
public class c
{
    public static void main(String[] args) throws Exception
    {
        FileReader inone =new FileReader(args[0]);
        FileOutputStream outone =new FileOutputStream(args[1]);
        int t=inone.read();
        while (t!=-1)
        {
            outone.write((char)t);
            t=inone.read();
        }
        outone.close();
    }
}
```

[8 Marks]

(question continues on next page)

(c) (i) Describe the behaviour of the following program:

```
class p
{
    public static void main(String [ ] args)
    {
        Integer.parseInt("bye");
    }
}
```

(ii) Using *try* and *catch*, write a method whose heading is `boolean checkInt(String s)` which returns `true` if `s` is a string of digits and `false` otherwise.

[8 Marks]

QUESTION 3

- (a) (i) What is the output of the following Java program?

```
class div1
{
    public static void main(String[] args)
    {
        System.out.println(3/2); //int divided by int
    }
}
```

- (ii) What is the output of the following Java program?

```
class div2
{
    public static void main(String[] args)
    {
        System.out.println(3/2.0); //int divided by real
    }
}
```

- (iii) What is the output of the following Java program?

```
class Precedence
{
    public static void main(String[] args)
    {
        System.out.println(5*1+1);
    }
}
```

[9 Marks]

(question continues on next page)

- (b) (i) The Unicode value for the character 'B' is 66. What is the output of the following program?

```
public class Unicode1
{
    public static void main(String [ ] args)
    {
        System.out.println((char)66);
    }
}
```

- (ii) 2147483647 is the largest value that can be stored in a variable of type int. What is the output of the following program?

```
public class LargestInt
{
    public static void main(String [ ] args)
    {
        int i = 2147483647;
        System.out.println(i+1);
    }
}
```

- (iii) Why might the following program crash?

```
public class BigMemory
{
    public static void main(String [ ] args)
    {
        int a[] = new int[100000000];
    }
}
```

- (iv) What is the output of the following program?

```
class EOF
{
    public static void main(String[] args)
    {
        System.out.println((int)((char)(-1)));
    }
}
```

(question continues on next page)

[8 Marks]

- (c) (i) What is the output of the following program?

```
class arrayParams
{
    public static void main(String [ ] args)
    {
        int[]a=new int[1];
        a[0]=1;
        p(a);
        System.out.println(a[0]);
    }
    static void p(int [ ] m)
    {
        m[0]=5;
    }
}
```

- (ii) What is the output of the following program?

```
class arrayParams2
{
    public static void main(String [ ] args)
    {
        int[]a= new int[1];
        a[0]=5;
        p(a);
        System.out.println(a[0]);
    }
    static void p(int [ ] m)
    {
        m= new int[3];
        m[0]=7;
    }
}
```

(question continues on next page)

(iii) What is the output of the following program?

```
class StringParams
{
    public static void main(String [ ] args)
    {
        String n="hello";
        p(n);
        System.out.println(n);
    }
    static void p(String m)
    {
        m="goodbye";
    }
}
```

(iv) What is the output of the following program?

```
class TestInt
{
    static void change(int a)
    {
        a=17;
    }
    public static void main (String [] args)
    {
        int z=5;
        change(z);
        System.out.println(z);
    }
}
```

[8 Marks]

QUESTION 4

- (a) (i) What is the output of the following program?

```
class Hello5
{
    public static void main(String[] args)
    {
        int s;           //Declaration of variable s
        s = 15*2;        //assignment statement
        System.out.println("s");
    }
}
```

- (ii) What is the output of the following program?

```
class p2
{
    public static void main(String[] args)
    {
        String x = "hello ";
        x=x+x;
        System.out.println(x);
    }
}
```

- (iii) What is the output of the following program?

```
class p6
{
    public static void main(String[] args)
    {
        int x= 11;
        System.out.println(x/0);
    }
}
```

[9 Marks]

(question continues on next page)

(b) Consider the following Java class:

```
public class Date
{
    public int day;
    public int month;
    public int year;

    public Date(int d, int m, int y)
    {
        day=d;
        month=m;
        year=y;
    }
}
```

- (i) How many instance variables does it have?
- (ii) Using *new*, create a Date Object corresponding to 10th April 1992.

(question continues on next page)

Now consider the Java class

```
public class Person
{
    public String firstname;
    public String lastname;
    public Date dob;
    public boolean sex; //true= female, false = male

    public Person(String f, String l, Date birth , boolean s)
    {
        firstname=f;
        lastname=l;
        dob=birth;
        sex=s;
    }
    public Person(String f, String l, Date birth, String s)
    {
        firstname=f;
        lastname=l;
        dob=birth;
        if (s.charAt(0)=='f' || s.charAt(0)=='F') sex=true;
        else sex=false;
    }
}
```

(iii) How many constructors does it have?

(iv) Create a female Person called Mary Smith whose birthday is 10th April 1992.

[8 Marks]

(c) Using inheritance, extend the class Person, above, to have a middle name.

[8 Marks]